



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **ASADA, Hitoshi et al.**

Group Art Unit: **2811**

Serial No.: **09/753,616**

Examiner: **Gebremariam, Samuel**

Filed: **January 4, 2001**

P.T.O. Confirmation No.: **1580**

For: **CMOS IMAGE SENSOR AND MANUFACTURING METHOD OF THE SAME**

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Date: March 7, 2003

Sir:

Prior to continued examination on the merits, please amend the above-captioned patent application as follows:

IN THE CLAIMS:

Please amend claim 2 as follows:

2. (Twice Amended) A CMOS image sensor comprising a pixel consisting of:
a photodiode having an impurity region formed in semiconductor substrate;
a first MOS transistor formed on said semiconductor substrate, the first MOS transistor having an impurity region as a drain connected to said impurity region of said photodiode;
a second MOS transistor formed on said semiconductor substrate, the second MOS transistor having an impurity region as a source connected to a source of said first MOS transistor; and
a third MOS transistor formed on said semiconductor substrate, the third MOS transistor having an impurity region as a source connected to a drain of said second MOS transistor,

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wherein an insulating film formed on the first, second and third MOS transistors, the insulating film having contact holes reaching the sources and drains of the first, second and third MOS transistors,

a silicide film is not formed on a surface of the drain of the first MOS transistor, but the silicide film is formed on each surface of the sources and drains of the first, second and third MOS transistors except for the drain of the first MOS transistor.

Please add new claims 14 and 15 as follows:

14. A CMOS image sensor comprising:

a photodiode having an impurity region formed by introducing impurities into the semiconductor substrate;

first and second MOS transistors having source regions and drain regions formed respectively by introducing impurities into the semiconductor substrate; and

an insulating film formed on the first and second MOS transistors, the insulating film having contact holes reaching the source regions and drain regions of the first and second MOS transistors,

wherein a silicon oxide film is formed on a surface of the impurity region of the photodiode and the drain region of the first MOS transistor which connects to the impurity region of the photodiode, but a silicide film is formed on a surface of the source region of the first MOS transistor which is also the drain region of the second MOS transistor and on a surface of the drain region of the second MOS transistor.

15. A ~~S~~ CMOS image sensor comprising:

a photodiode having an impurity region formed by introducing impurities into the semiconductor substrate;

first and second MOS transistors having source regions and drain regions formed respectively by introducing impurities into the semiconductor substrate; and

an insulating film formed on the first and second MOS transistors, the insulating film having contact holes reaching the source regions and drain regions of the first and second MOS transistors, wherein a silicon oxide film is formed on a surface of the impurity region of the photodiode and the drain region of the first MOS transistor which connects to the impurity region of the photodiode, but a silicide film is formed on a surface of the source region of the first MOS transistor which is also the drain region of the second MOS transistor and on a surface of the drain region of the second MOS transistor, and

a concentration of the impurity region of the photodiode differs from that of the drain region of the first MOS transistor.